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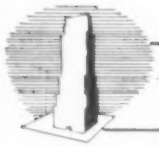

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VOLUME LVIII SEPTEMBER, 1959 NUMBER 6

WORLD PATTERNS AND TRENDS IN ENERGY CONSUMPTION*

E. WILLARD MILLER
The Pennsylvania State University

The role call of the world's natural resources begins with those which are primarily energy producing. The drama of man's last century of progress to the level of current living standards in this and other countries can be written in his conquest of coal, petroleum, natural gas, and water power. His ability to rise to higher levels of living will depend to a large extent on improved technology, development of new sources of energy and on the ability to interchange energy sources.[1]

WORLD ENERGY CONSUMPTION

Since the beginning of the Industrial Revolution world consumption of energy has risen at a constantly increasing rate. World production of coal and lignite in 1958 was at a rate of 2,140,000,000 tons annually. With the discovery of large reserves of petroleum and natural gas, an increasing proportion of the world's energy supplies has come from these sources. World production of crude oil in 1958 was 6,645,000,000 barrels. This is the equivalent in energy content to about 1.8 billion tons of coal. Natural gas production has also grown to a present output of about 275,000 million cubic meters. This is an energy equivalent of an additional 0.7 billion tons of coal. From the three major fossil fuels the world consumes an amount of energy equivalent to about 4.5

* The writer wishes to express his appreciation for aid granted by the College of Mineral Industries of The Pennsylvania State University. The maps for this paper were drawn by Mr. Joseph Gregory, Graduate assistant in the Department of Geography of The Pennsylvania State University.

[1] An excellent general discussion on the importance of energy in the world is found in: Eugene Tyrrell and Charles A. Scarlott, *Energy Sources—The Wealth of the World*, McGraw-Hill Book Co., Inc., New York, 1952, 344 pp.; and Olin T. Mauzon, *International Resources and National Policy*, Harper and Brothers, New York, 1959, pp. 223-516.

billion tons of coal annually, corresponding to about 1.7 tons of coal per capita. To this must be added the amount of coal corresponding to that which would be required to generate the electricity developed from water power, and power obtained from the consumption of vegetable fuels. However, these sources of energy are relatively small, amounting to less than 0.2 billion tons of coal annually.

Distribution of World Energy Consumption

The consumption of energy in the world is exceedingly unevenly distributed. According to the United Nations in 1956, nineteen coun-

Fig. 1. The energy consumption of the world is centered in the countries facing the North Atlantic Ocean.

tries with a per capita consumption of the equivalent of more than 0.5 tons of coal consumed slightly over 90 per cent of the commercial sources of energy. As shown on Fig. 1 the energy consuming belt of the world centers in the countries touching the North Atlantic Ocean. Of these countries the United States occupies a dominant position, consuming an equivalent of 8.58 tons of coal per person. If all the people of the world were to expend energy at the per capita rate of the United States, there would be a present need for energy sources the equivalent to over 22 billion tons of coal annually.

Europe and the U.S.S.R., consume energy the equivalent of about 2.5 tons of coal per capita.

In Asia, Japan consumed the equivalent of nearly one ton of

coal per person. By contrast, the rest of Asia, where nearly one half of the world's population resides, consumed energy from coal, petroleum and waterpower at a rate equivalent to 100 pounds of coal per capita annually. This is about the amount that is consumed in the United States per person in two days.

The consumption of energy in South America and Africa is amazingly low averaging in 1956 only the equivalent of .56 and .26 tons of coal per person respectively.

FUTURE TRENDS OF ENERGY CONSUMPTION

The predictions of future energy requirements in the past have essentially been out-of-date the moment they were published because of the phenomenal increase in energy consumption. At the present time there appears no reason to assume that the world is near a stage of stability in energy consumption. Even in the United States which is already highly industrialized, per capita energy consumption is increasing.

The rate of absolute increase of energy consumption for the rest of the world will probably be far greater than for the U. S. in the future as a result of increasing population and particularly as major efforts are made to industrialize the underdeveloped countries.[2] The experience of countries which have recently been in economic transition such as Japan and the Soviet Union reveals that it is possible for energy consumption to rise with enormous rapidity. It is quite possible that once industrialization is well underway in India, China, Latin America, and Africa, energy consumption in those areas will double every decade.

Some accuracy in prediction of the world's future energy demands may be gained by an understanding of past trends. In the period 1860 to 1958 world production of energy increased on the average at the rate of 3.25 per cent annually. The curve, however, is not smooth. There was an almost uninterrupted rise in production from 1860 to 1913, but since then the curve has been characterized by abrupt fluctuations. The periods 1919-1929, 1932-1939, and 1945 to the present are marked by rapid rises in energy consumption. During these four growth periods beginning in 1860, production of commercial sources of energy rose at the rate of

[2] In the report, *The Future Growth of World Population*, United Nations Population Studies No. 28, New York, 1958, it is estimated that in the next 25 years the world's population will increase from 2500 to 4000 million and by 2000 be over 6000 million.

4.5 per cent, 4 per cent, 5 per cent, and 5.5 per cent annually respectively. The periods of stagnation or decline in energy production coincide with World War I, the world economic depression of the early 1930's and World War II.

It seems reasonable to assume that future rates of growth in world requirements of energy, barring wars or economic catastrophes, will lie somewhere within the range of 4 to 5 per cent annual increase. At such an annual increase by 2000 AD the world will be

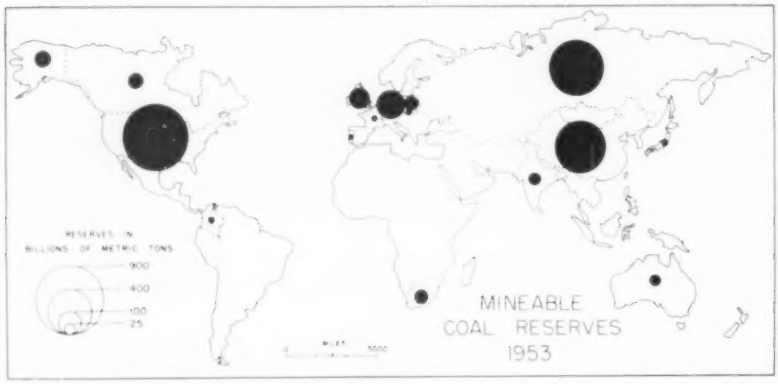

Fig. 2. The coal deposits of the world are unevenly distributed with the United States, Soviet Union and China having more than three fourths of the total.

consuming energy of the equivalent of 25 to 37 billion tons of coal annually. A basic question must now be raised, from what sources can the world secure its growing demands for energy?

Reserve of Fossil Fuels

To the present the world has depended to a dominant degree for its energy requirements on coal and petroleum. In order to predict the future production of the fossil fuels it is essential that the best estimates of the world ultimate reserves be known. Geological information regarding the availability of fossil fuels has advanced so effectively in recent years that estimates with some degree of accuracy are now available for the potential production of coal and petroleum. The total recoverable coal and lignite reserves of the world are now estimated to be about 2500 billion metric tons, of which the United States has about one third, the

Soviet Union about one fourth, and China approximately one fifth of the total (Fig. 2).[3]

Within recent years there has also been the attempt to estimate the world's potential petroleum production (Fig. 3).[4] It now appears that about 1250 billion barrels of oil may ultimately be extracted from the earth's crust. This is equivalent in energy content to about 280 billion tons of coal. Of the distribution of petroleum, the Middle East possesses the largest reserve estimated at

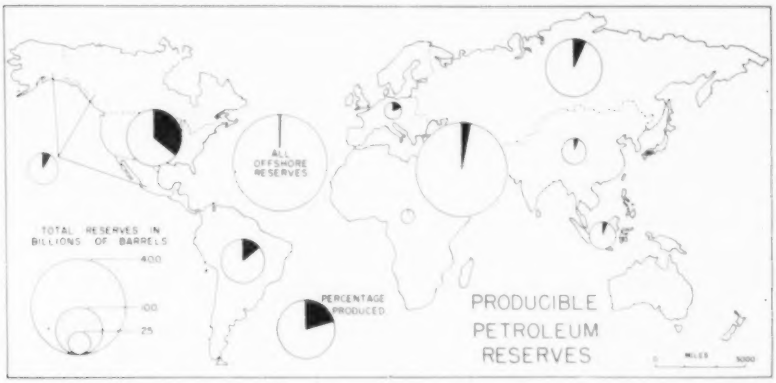

FIG. 3. The world's greatest petroleum reserves are located in the Middle East. Notice the large offshore reserves.

375 billion barrels. The potential recoverable reserves of the United States are now placed at 130 billion barrels from land areas and 20 billion barrels from off-shore areas. South American reserves, primarily in Venezuela, are placed at 80 billion barrels.

To the basic energy sources of coal and petroleum, natural gas

[3] Paul Averitt, Louise R. Berryhill and Dorothy A. Taylor, *Coal Resources of the United States* (A Progress Report), U. S. Geological Survey Circular 293, October 1, 1953.

[4] L. G. Weeks, *Concerning Estimates of Potential Oil Reserves*, Bulletin of the American Association of Petroleum Geologists, Vol. 34, part 2, 1950, pp. 1947-1954 and L. G. Weeks, *Factors of Sedimentary Basin Development that Control Oil Occurrences*, Bulletin of the American Association of Petroleum Geologists, Vol. 36, part 2, 1952, pp. 2071-2125; A. I. Levorsen, *Estimates of Undiscovered Petroleum Reserves*, Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources, New York, Vol. 1, 1950, pp. 94-99; Wallace E. Pratt, *The Impact of the Peaceful Uses of Atomic Energy on the Petroleum Industry*, Report of the Panel on the Impact of the Peaceful Uses of Energy, Vol. 2, (Background Material), 1956.

must be added. To date world reserves of natural gas have not been estimated. However, crude oil and natural gas are related genetically and there may be as much energy from natural gas as petroleum.

To the above reserves must be added the oil which might be extractable from bituminous shales and tar sands.[5] The oil obtainable from oil shales is estimated at a minimum of at least 4000 billion barrels for the world. Ayres and Scarlott have ventured an educated guess that the total oil obtainable from tar deposits of the world would be 800 billion barrels.

If the fossil fuels of the world are converted to a single unit, there would appear to be the equivalent of approximately 3700 billion tons of coal of which about 70 per cent is coal, 16 per cent oil from oil shales and tar sands, and 14 per cent from petroleum and natural gas.

The rapid rate of growth, plus the potential reserve of fossil fuels, present a particularly deceptive viewpoint with regard to the future length of time for which such production may be sustained. For example, coal has been mined continuously for about 800 years, and by the end of 1957 the cumulative production was about 100 billion metric tons. It is somewhat surprising, however, to discover that the entire period of coal mining up until 1930 was required to produce the first half, whereas only 27 years were required for the second half.

Such facts as these force one to ask how long such rates of growth can be maintained. That the number must be small can be inferred from the fact that after n doubling periods, the production rate will be increased by a factor of 2^n. Thus in 10 doubling periods the production rate would increase by a thousandfold; in 20, by a millionfold. No finite resource can sustain for longer than a brief period such a rate of growth of production. Therefore, altho production rates tend initially to increase exponentially, physical limits prevent their continuing to do so.

Changing Patterns of Fossil Fuel Consumption

For the years ahead, there will be major changes in the pattern of fossil fuel consumption in the world. Liquid-fuels, because of their convenience and versatility, will be in greatest demand. How-

[5] M. King Hubbert, *Nuclear Energy and the Fossil Fuels*, Drilling and Production Practice—1956, American Petroleum Institute 1957, pp. 7-25.

ever, because of the relatively low reserves, petrolum will be exhausted first of the fossil fuels. As the limits of the earth's petroleum reserves are reached and costs of exploitation rise, the extraction of liquid hydracarbons from oil shales and tar sands will increase. These reserves, however, are also limited and by the time they are in demand world consumption will be much greater so that these deposits will soon be exhausted. The world must then rely for its oil on a large scale from coal.

These changes in patterns of energy consumption will take place unevenly thruout the world as a result of the unevenness in distribution of fossil fuels and difference in the rate of technological advance. Thus, such countries as the United States, Germany, France, United Kingdom, and the Soviet Union will pass thru the above fuel stages relatively fast. However, many countries of the world will not be able to follow this pattern because of lack of fossil fuels.

It, thus, becomes apparent that most of Africa and Latin America, and certain countries of Europe and Asia will be greatly handicapped in developing an industrial economy utilizing traditional energy resources. Altho small reserves of fossil fuels may initiate the industrial process in these areas, long before they attain a per capita level of expenditure characteristic of the United States, they must utilize new sources of energy.

It must not be thought that only the nations poor in fossil fuel reserves will experience difficulty in the near future in securing adequate energy. Western Europe is now importing coal from the United States. Even the United Kingdom ,which possesses the most extensive coal fields in the world in relation to area, is experiencing difficulties in satisfying her energy needs. The United States is no longer self sufficient in petroleum and now imports more than 1,000,000 barrels of petroleum daily.

As the energy consumption of the world's nations increases there is a growing need for a wider utilization of the earth's energy resources. To a large degree one fuel can be substituted for another provided its price is attractive and it can be supplied in sufficient quantity.

Hydroelectric Power Potential

It has frequently been stated that the world can depend increasingly for its energy needs from hydrolectric power. At the present

time only a small portion of the potential water power resources of the world has been utilized (Fig. 4). Europe, which has developed about 48 per cent of its total potential, and North America, about 45 per cent, lead the continents in the use of water power. In France, Italy, Switzerland and Germany nearly 100 per cent of the available water power is now being utilized. But in many other areas of the world the merest beginning has been made. In Africa where the greatest sources are located, only 0.2 per cent is harnessed. For the world as a whole, about 13 per cent of the estimated ordinary minimum flow potential has been developed.

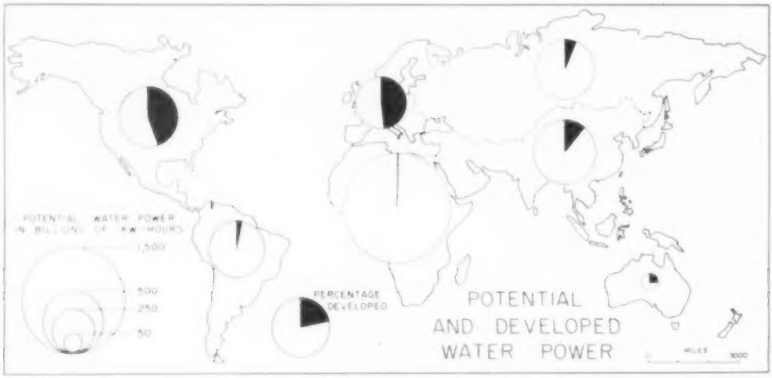

Fig. 4. North America and Europe have the largest portion of their potential water-power developed. Africa and Latin America are in the initial stages of developing their hydroelectric power.

However, an examination of the potentialities of hydroelectric power, reveals its inadequacy as a major source of power for the future. Full development of total water power potential in the U. S. would give a generating capacity, based upon ordinary minimum flow of about 35 million horsepower, or an energy output of about 300 billion horsepower—hours annually. This would amount to little more than 2 per cent of the United States energy requirements at the present rate of consumption. The water power resources of Africa, if fully developed, would provide annually about one-fifth the amount of present energy consumption of the United States. Water power is an important source of energy, but if the world had to depend on it the per capita rate of consumption would be small.

NEW SOURCES OF ENERGY

If the rate of energy consumption continues to accelerate, essentially untapped energy resources must be utilized. Such potential energy resources as geothermal heat, methane from coal mines, natural carbon dioxide, thermal energy of the seas, tidal energy and wind energy appear to be of limited usefulness. From a long range viewpoint it appears that there must be a greater dependence upon solar and nuclear energy. From a technological viewpoint both of these can be utilized. The question of which one will be developed first will depend largely on economics.

The energy the earth receives annually from solar radiation is about 35,000 times the present yearly energy consumption. If it were possible to transform one ten-thousandths of the sun's radiation directly into power, the world's energy production would be increased by about 250 per cent. At present only an infinitesimal portion of the solar energy is utilized. There are two reasons for this. First, radiation is distributed over the whole world facing the sun, and is therefore not sufficiently concentrated to lend itself to economic utilization by simple means. Secondly, there is no uniformity in the distribution of the energy due to latitudinal controls and climate influences. Climatically the low latitude desert areas are best suited to a development of solar energy. The areas of high cloud covering and those in the high latitudes are least desirable to utilize solar energy (Fig. 5).

With increasing demands, a larger portion of the world's energy will gradually come from nuclear sources. The Geneva Conference on the Peaceful Uses of Atomic Energy in 1955 demonstrated that it was technically and economically feasible to develop atomic power plants in many sections of the world.

It is now generally thought that by 1980 nuclear power should represent a significant proportion of world power production, primarily as a replacement for fossil fuels in electrical power production. Because nuclear energy using uranium and thorium will become increasingly important to power an industrial world, a knowledge of the reserves of these materials is necessary. These elements, like coal and petroleum, are finite in amount. Known commercial reserves in the world of uranium and thorium have never been accurately estimated. Nevertheless, the energy available to man from these sources is enormously greater than the energy contained in the world's reserves of coal and petroleum.

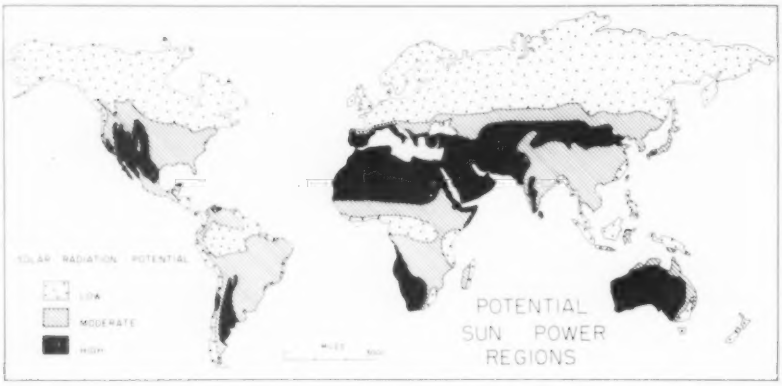

FIG. 5. The potential maximum solar radiation at any place on the earth depends upon its latitudinal position and the amount of cloud covering. The areas of high solar radiation potential lie in the low latitudes where a cloud covering exists less than 20 per cent of the time. The areas of low solar radiation potential are found in the high latitudes or where the cloud covering is greater than 60 per cent of the time.

The high grade uranium and thorium ores will be utilized first. These ores are widely distributed (Fig. 6). The largest known uranium deposits are near Elizabethville in the Belgian Congo, Beaverlodge, Port Radium, Bancroft, and Blind River in Canada, and the Colorado Plateau in the United States. Thorium occurrences are more limited. The largest known deposits are along the Malabar Coast, Travancore, India, on the coasts of Bahia and Espirito Santo, Brazil, and in Florida.

Altho the high grade ores of uranium and thorium may be exhausted relatively soon, uranium and thorium are found in small but significant quantities in granite.[6] Average granite contains about 4 parts per million of uranium and about 12 parts per million of thorium. There is, thus, the energy equivalent in one ton of granite to about 50 tons of coal. Not all of this energy is available for the process of extracting the elements from the rock necessitates a substantial energy expenditure. It has been found, however, that about one-third of the uranium and thorium is localized within the rock in such a way that it can be extracted with a modest ex-

[6] Harrison S. Brown and L. T. Silver, *The Possibilities of Securing Long-Range Supplies of Uranium, Thorium and Other Substances from Igneous Rocks*, United Nations: Proceedings International Conference on the Peaceful Uses of Atomic Energy, Vol. 8, Geneva, 1955, pp. 129-132.

FIG. 6. The nuclear fuel deposits are widely scattered in the world. Many areas are still unexplored and new deposits can be expected to be discovered in the future.

penditure of energy. This means that from a long range point-of-view man need not be confined to high grade uranium and thorium ores for his energy. Granite is widely distributed thruout the world so that most areas would be relatively near large sources of nuclear energy.

CONCLUSIONS

The energy problem of the world will become increasingly complex. The traditional fuels will supply most of the needs for the remainder of the twentieth century. However, new sources of energy will gradually be developed primarily due to two factors. First, fossil fuels will eventually be depleted making dependence on new energy sources necessary. Secondly, fossil fuels are extremely unevenly distributed so that many areas can not develop an industrial economy with these traditional sources of energy. International trade in energy resources will continue to expand. At the same time competition for available energy supplies will rise. As demands grow, it will be increasingly necessary for each country to supply its own energy requirements from domestic sources.

November 1959 Meeting

A preliminary program of the forty-fifth annual meeting of the National Council for Geographic Education is on pages 304-307 of this issue. Have you made your hotel reservations in Detroit for the nights of November 27 and 28?

THE STATUS OF GEOGRAPHY IN THE SOCIAL STUDIES CURRICULA OF CANADIAN SCHOOLS

THOMAS R. WEIR
University of Manitoba

WILLIAM J. RUSSELL
Daniel McIntyre Collegiate Institute

Three concepts are involved in determining *status* of a subject within a prescribed curriculum: 1) whether it is separate or integrated; 2) whether it receives a major or minor share of the teaching time; and 3) whether it is optional or compulsory.

At the time Manitoba's Royal Commission on Education began receiving submissions, it became apparent that such information about geography and history was not available on a comparative basis. To arrive at these concepts in respect to geography, questionnaires were submitted to directors of curricula for the ten provinces of Canada.[1] Additional information relating especially to *emphasis* in terms of teaching time was derived from Courses of Study for the different provinces. The results were compiled and set forth in Tables 1 to 4.

In the curricula of all Canadian schools above grade six geography and history are studied under the subject name of Social Studies. In five provinces[2] "Social Studies" implies a close integration of historical and geographical material together with minor amounts of information culled from other of the Social Sciences. According to this concept the attempt is made to fuse two or more disciplines with fundamentally different philosophical bases into a single subject, a feat impossible of attainment on purely logical grounds. In the remaining five provinces, "Social Studies" is used merely as a convenient term to group geography and history as separate, parallel subjects. This grouping does not violate the integrity of either discipline and yet recognizes the complementary nature of the two.

The areal separation of these two concepts of social studies is sharply defined in Canada. The Eastern provinces (excepting

[1] In the case of Quebec Province, where three curricula are recognized, three replies were received. Only two, however, have been set forth in the tables since the third (English Catholic schools) is numerically very small.

[2] Ontario, Manitoba, Saskatchewan, Alberta and British Columbia (see Table 1).

TABLE 1

SOCIAL STUDIES—INTEGRATED COURSES

PROVINCES:	Geography (g) History (h) Capital letters (G or H) show greater emphasis					
	GRADES					
	7	8	9	10	11	12
NEWFOUNDLAND						
P.E.I.						
NOVA SCOTIA						
NEW BRUNSWICK			g/H			
QUEBEC PROTESTANT (English)						
QUEBEC CATHOLIC (French)						
ONTARIO	g/H	g/H	g/H	G/h		
MANITOBA	g/H	g/H	g/H			
SASKATCHEWAN			g/H	g/H	g/H	g/H
ALBERTA	g/H	g/H	g/H	g/H	g/H	g/H
B.C.	g/H	g/H			g/H	

Ontario)[1] regard "Social Studies" as a convenient term to group geography and history as distinct, separate tho parallel courses (Table 2). On the other hand, the four Western provinces, together with Ontario, in most grades of Junior and Senior High School attempt to integrate the two subjects to produce a third termed Social Studies. Much criticism has been levelled at this attempt,

TABLE 2

SOCIAL STUDIES—SEPARATE COURSES

PROVINCES:	Geography: (G) Compulsory; (g) Elective History: (H) Compulsory; (h) Elective						
	GRADES						
	7	8	9	10	11	12	13
NEWFOUNDLAND	G/H	G/H	g/h	g/h	g/h		
P.E.I.	G/H	G/H	G/H	G/H	/H	/H	
NOVA SCOTIA	G/H	G/H	G/H	g/H	/H	/H	
NEW BRUNSWICK	G/H	G/H		/H	/H	/H	
QUEBEC PROTESTANT (English)	G/H	g/H	g/H	g/h	g/h	/h	
QUEBEC CATHOLIC (French)	G/H	G/H	G/H	G/H	G/H	G/H	
ONTARIO					g/H	g/H	g/h
MANITOBA				G/h	g/H	g/H	
SASKATCHEWAN	G/	/H					
ALBERTA							
B.C.			G/	g/H	g/h	g/h	

[1] The Minister of Education for Ontario has recently announced that "separate courses in history and geography for grades 7, 8, 9, and 10 parallel to the existing courses in Social Studies, are being prepared." (Private communication)

both in theory and in practice, and certainly not without justification in the light of results obtained.

Analysis of the Tables

First let us treat of that aspect of *status* which is concerned with history and geography as either separate or as integrated courses. If we include the two curricula numerically important in Quebec, we have a total of 35 "Social Studies" courses authorized in the five provinces of Eastern Canada (Table 2). In only one grade of one province (New Brunswick) is the course an integrated one (Table 1); the remaining 34 courses treat geography as separate from history (Table 2).

On the other hand in Ontario and the four Western provinces, out of a total of 32 courses labelled "Social Studies," 20 integrate history and geography (see Table 1). Or expressing it as a percentage, in the Maritimes and Quebec 97 per cent of the courses teach geography and history as separate subjects while in Ontario and the West only 37 per cent of the courses treat geography and history separately.

As noted above, among the Eastern Provinces only New Brunswick at *one* grade level has sought to integrate the two subjects, gaining in this respect a dubious distinction (Table 1). Of the Western group only one province has sought to integrate the two subjects at *all* grade levels, namely, Alberta, gaining thereby an

TABLE 3

Social Studies—Integrated Courses

PROVINCE	All Courses Compulsory: Major Teaching Emphasis		Total Courses
	Geography	History	
NEWFOUNDLAND			
P.E.I.			
NOVA SCOTIA			
NEW BRUNSWICK		9	1
QUEBEC PROTESTANT (English)			
QUEBEC CATHOLIC (French)			
ONTARIO	10	7–9	4
MANITOBA		7–9	3
SASKATCHEWAN		9–12	4
ALBERTA		7–12	6
B.C.		7, 8, 11	3
Total Courses:	1	20	21

even more dubious distinction. Ontario, Manitoba and British Columbia show a tendency to integrate these subjects in the Junior High School, while above that level the tendency is toward separation.

In answer to the questionnaire, however, Ontario, Manitoba, Saskatchewan and British Columbia indicated a trend towards separation of history and geography; only in Alberta was there expressed officially no interest in separation. However, it has become evident in statements emanating more recently from groups of Alberta teachers that many desire to separate these subjects.

Now, let us turn to the second aspect of *status*, namely, the emphasis given in terms of *teaching time*. In the *integrated* Social Studies program (largely a Western phenomenon) out of 21 courses, only one gives more teaching emphasis to geography than history, namely, the tenth grade in Ontario (see Table 3). While the teaching time varies from grade to grade and from province to province, in the great majority of courses about two-thirds of the time is given to history and one-third to geography. In no case does it appear in the integrated program that equal emphasis is given to geography and history.

The third aspect of *status*, namely, whether optional or compulsory, is set forth in Table 4 and concerns only the non-integrated Social Studies program. Out of a total of 81 separate courses in history and geography offered in the Junior-Senior High School grades, 21 require geography as a compulsory subject while a

TABLE 4

SOCIAL STUDIES—SEPARATE COURSES

PROVINCE	Geography		History		Total
	Compulsory	Elective	Compulsory	Elective	
NEWFOUNDLAND	7-8	9-11	7-8	9-11	10
P.E.I.	7-10		7-12		10
NOVA SCOTIA	7-9	10	7-12		10
NEW BRUNSWICK	7-8		7-8, 10-12		7
QUEBEC PROTESTANT (English)	7	8-11	7-9	10-12	11
QUEBEC CATHOLIC (Fench)	7-12		7-12		12
ONTARIO		11-13	11-12	13	6
MANITOBA	10	11-12	11-12	10	6
SASKATCHEWAN	7		8		2
ALBERTA					
B.C.	9	10-12	10	11-12	7
Total Courses:	21	16	34	10	81

further 16 offer it as an elective. Thirty-four of the 81 courses have history compulsory while an additional 10 offer it as an elective. That is to say, geography is a compulsory subject in 25 per cent, and history in 41 per cent of the courses offered in the non-integrated program (Table 4).

In only one province are geography and history taught as separate, parallel and nearly equal courses in all grades of Junior-Senior High School, namely, the French speaking schools of Quebec. Perhaps it is the Old World influence perpetuating itself within this language group, but whatever the cause it becomes in the authors' opinion the only satisfactory division of content in any Social Studies program.

Happily, flashes of light are to be noted amid the endless grouping of curriculum makers in the field of Social Studies in a few grades in a few provinces. Thus, Newfoundland requires that both geography and history be taught as separate subjects in grades 7 and 8, while placing them on an optional basis above that level (Table 2). Prince Edward Island makes them separate and compulsory from grades 7 to 10; Nova Scotia from 7 to 9 and New Brunswick in 7 and 8. In the Maritimes, in the upper grades of senior High School, history alone is compulsory. Geography does not appear even as an option above grade 10. This is doubtless due in large part to the absence of geography in University where it might be elected as a course by teachers in training.

In Ontario the non-integration of geography and history occurs in grades 11 to 13. In these grades, geography may be taken as an option while history is compulsory except in grade 13 (Table 2). In Manitoba, geography is required in grade 10, at least for the present, and is elective in 11 and 12 with history compulsory. Saskatchewan reverses the trend to integration in the lower grades by teaching geography only in 7, history only in 8, and then reverting to an integrated program of 9 to 12 (Table 2). British Columbia requires geography only in grade 9 while making it optional with history above that level.

Taking the provinces as a whole, the pattern very definitely points to history as the dominant and required subject above the Junior High School level. While it is important that students be well trained in history, it is equally important that more emphasis be given to geography in the senior grades. This points up a serious deficiency in Canadian Social Studies curricula.

A trend to greater emphasis on geography in the Senior High School appears to be more marked in the Western Provinces and Ontario than in the Maritimes. Saskatchewan is considering a separate geography course in grade ten. Manitoba has numerous recommendations before the Royal Commission on Education from teachers, historians and geographers for separation of the two subjects at every grade level above 6. This should mean a clearer definition of the subjects. A division of opinion exists, however, as to the emphasis to be given geography in the Senior High School. In British Columbia the swing to more emphasis on High School geography may be anticipated in the present course revision. In Ontario a revision is in progress for the separation of geography and history in grades 7 to 10.

There appears to be a direct correlation between increased demand for the teaching of geography above the elementary levels in all those provinces where departments of geography have been established in the Universities, namely, Quebec, Ontario, British Columbia, Manitoba and, more recently, Alberta. The opposite is true of the Maritimes and Saskatchewan where no voice is heard at University level to advocate the teaching of geography in senior grades and in the training of future teachers.

In four of the ten provinces, geography may be elected as a University entrance subject, namely, British Columbia, Ontario, Quebec and Newfoundland. In the first three provinces, departments of geography have been well and long established. In the remaining six Canadian provinces there are either no departments of geography or the departments are still relatively young.

In conclusion, it would appear that the major impetus in the acceptance of geography in secondary school education is coming from the University geography departments both *indirectly* thru the education of prospective teachers who in turn are qualified to present geography effectively at all grade levels, and *directly* by demonstrating the importance of a sound geographic training in general education.

Are You Going?

The 45th Annual Meeting of the National Council for Geographic Education will be held at the Sheraton-Cadillac Hotel, Detroit, Michigan, November 27 and 28, 1959. Are your plans completed?

KHARTOUM WEATHER

H. R. J. Davies
University of Khartoum, Khartoum, Sudan, Africa

Khartoum is situated at the junction of the White and Blue Niles, between latitudes 15° and 16°N. (Fig. 1). It is a typical tropical station with two temperature maxima, one in May and the second in October (Fig. 2). Its short, summer rainy season (Fig. 3) marks it out as being on the Equatorward edge of the Sahara Desert, in an area of short grasses and low, scattered, thorny bushes. Usually where the soil is clay the grasses are green for only two to three months. In the sandy areas the grasses tend to be tufted and remain green longer because of the better water supply available here.

The year falls into four distinct seasons:

From mid-November to March: a Cool, Dry season.
From April to mid-July: a Hot, Dry season.
From mid-July to mid-September: a Cooler, Rainy season.
From mid-September to mid-November: a lesser Hot, Dry season.

Cool, Dry Season

The cool, dry season is delightful with hot days of 80°F. to 90°F., and cool nights of 55°F. to 65°F., and is popular with everyone. Occasionally the thermometer reaches over 100°F. or drops below 50°F. It is the period when the intensely dry north-east winds are blowing. Sometimes air from Russia reaches here, giving temperatures below 50°F. On two or three occasions during the past 30 years ground frost has been probably recorded.[1] The dry north-east winds bring cloudless skies both by day and night, giving Khartoum its high daily range of temperature of 30°F. (Fig. 4). Because of the contrast with the other seasons people feel the cold. Often they come to work in a morning with a pullover on top of their 'gellabia' (a long, loose, white garment not unlike a nightshirt), and with scarves or woollen Balaclava helmets on their heads. This is the season for getting work done as everyone feels energetic. Most people during this period do however suffer from cracked skin due to the intense dryness of the atmosphere. The

[1] No ground temperatures are available for this period, but recent experience would suggest this.

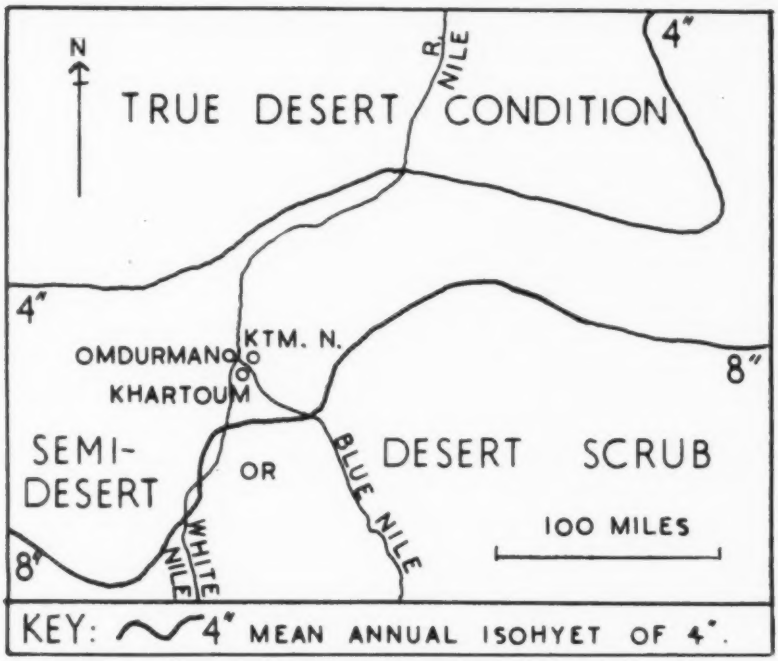

FIG. 1. Position of Khartoum. Figs. 1, 2 and 3 are based on the Provisional Normals of the Sudan Meteorological Service for the period (1921-50).

coolest period is in January just after the sun has reached its southern limit at the Tropic of Capricorn.

HOT, DRY SEASON

From February onwards the temperatures both by day and by night begin to rise. By the end of March the cool weather has departed, as the sun is now coming northwards again. The increasing heat over the Sahara causes the winter *high pressure* to be replaced by the summer *low pressure*, with the result that the north-east winds die away and are gradually replaced by the south-west winds which have their origin over the Atlantic Ocean south of the Equator. During this hot, dry season which lasts until the middle of July the shade temperatures may reach 115°F. by day. Khartoum's record is 118°F. At this period the daily temperature range is considerably reduced. First, there are 13 hours between sunrise and sunset as compared with 11 hours during the winter,

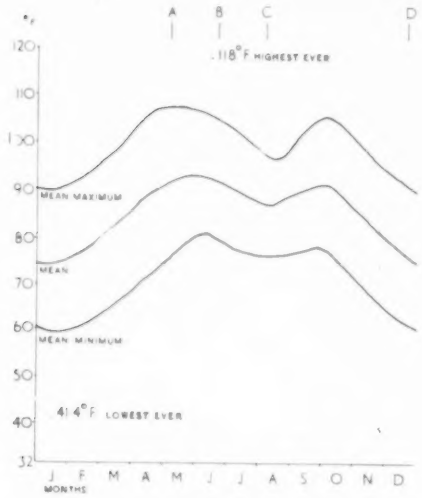

FIG. 2. Mean Monthly Temperatures at Khartoum (1921-50).

A. Midday sun overhead at Khartoum on its way northwards to Tropic of Cancer (May 6th.)

B. Midday sun overhead at Tropic of Cancer. Angle of midday sun from vertical at Khartoum approx. 8° (June 21st.).

C. Midday sun overhead at Khartoum on its way southwards (August 6th.).

D. Midday sun overhead at Tropic of Capricorn. Angle of midday sun from vertical at Khartoum approx. 39° (December 21st.).

Note time lag between the overhead sun and the peaks on the graph, and between the sun's limits north and south and the troughs.

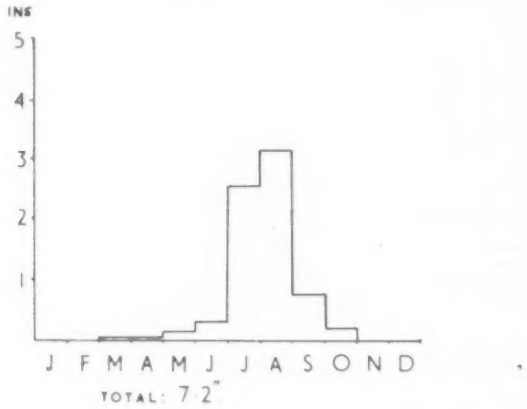

FIG. 3. Monthly Average Rainfall at Khartoum (1921-50).

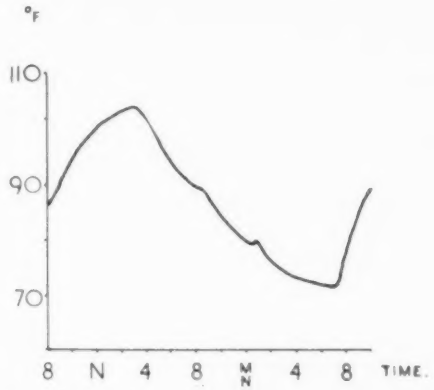

FIG. 4. Thermograph record for a warm day in the early winter of 1957. Figs. 4, 6 and 7 are based on thermograph records at the University of Khartoum.

Note: 1. Hottest time of the day is at about 3 in the afternoon, and the coolest just after sunrise. 2. More rapid rate of increase in temperature in the morning than decrease in the evening. 3. Wide diurnal temperature range of 34.4°F. 4. Stepping in the trace due to wind disturbance.

with a correspondingly shorter period of darkness in which the earth may cool down. Secondly, there is often cloud about, which has the unfortunate tendency to form at night, acting as a blanket, but dispersing with the heat of the day to give high temperatures.

The heat at this season is very trying for everybody. Work usually begins early at about 6 A.M., and little serious work is done after about noon, because the heat by then is intense. The hottest time of the day, it should be noted, is not at noon when the sun is at its highest, but between 2 and 3 o'clock in the afternoon, due to the time lag in the heating of the atmosphere. The streets are deserted during the afternoon, as people are taking a siesta in the relative coolness of their houses. The houses of the poorer people are built of thick mud-brick walls, which keep the interiors cool by day. The richer people have houses of burnt brick with windows and shutters which are closed by about 9 o'clock in the morning to keep out the heat. These people are also kept cool by fans. As Khartoum is hot in the afternoon for much of the year, life is arranged to meet it. Shops usually open at about 8 A.M. in the morning, and close at 1 P.M. In the evening the streets come to life again with the shops re-opening from 5 P.M. to 8 P.M. People can be seen sitting outside their houses, which retain the heat. Often inside temperatures do not reach their highest until 8 to 10 P.M. in the evening. For this reason many people also sleep

outside under the stars for much of the year. Most people work fewer hours per day in Khartoum than they would do in more temperate regions, and so a six-day working week is almost universal.

Sometimes this period coincides with *Ramadan*, the Mohammedan month of fasting, during which good Moslems neither eat nor drink between sunrise and sunset. Under such circumstances almost all work ceases. Sometimes at this time of the year foreigners suffer from heat exhaustion. Those without air conditioning envy those with. As many people as are able try to get away to the Red Sea Hills, Ethiopia, Egypt or other countries to avoid the intense heat. The University of Khartoum arranges its academic year so that the Long Vacation falls at this period. During term time lectures are held from 7 A.M. to 2 P.M. The worst period is usually the end of May or early June showing the typical short time lag after the passing of the overhead sun on the sixth of May.

This changeover season is also characterised by *haboobs*, which are hot, dry, dust-laden winds.[2] These storms may come from almost any point of the compass but most frequently from a southerly point. Their approach during the day can be seen as a big, black cloud of dust often reaching a hundred feet or more into the air, which rolls across the flat countryside. All windows, shutters and doors are firmly closed, but even so the dust and sand work their way into everything including food, which afterwards often tastes gritty. In a strong *haboob* conditions are almost suffocating. It can be difficult to see or breathe when facing into the wind and people hasten inside for shelter. By July *haboobs* usually are welcome as they are not so dust-laden and bring cooler, damp air, with a relief from the high temperatures. *Haboobs* can occur at any time of the year but are most frequent at this and the later changeover season.

Cooler, Rainy Season

In some years rain occurs before mid-July, and occasionally heavy falls are experienced due to the variation from one year to the next in the movement northwards of the Inter-Tropical Convergence Zone (or the region in which the north-east and south-west winds meet). This rainy season, lasting until about the middle of September, comes as a welcome relief from the hot, dry conditions of the previous three months. Khartoum is close to the

[2] In strict usage a *haboob* means any strong wind, but in common parlance is often used of dust storms only.

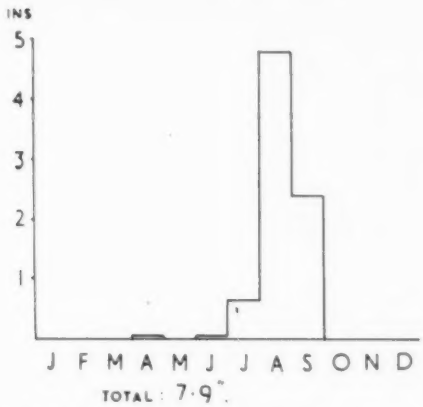

FIG. 5. Monthly Rainfall at Khartoum in 1957. Based on rain gauge readings at the University of Khartoum.

Note: Rainfall total about average but the season was later than usual: thus August received 50% above average; September 3 times average; but July only ¼ of the average fall for that month.

southern edge of the Sahara, receiving an average annual rainfall (1921-50) of 7.2 inches. The strength of the movement northwards of the south-west winds varies from one year to another and so the rainfall received, the length of the rainy season, and the dates of its beginning and end are quite variable (Fig. 5). It does not rain every day; a good year will average two reasonable sized rain storms per week. The rain can be torrential, with perhaps 1 or 2 inches falling in as many hours on occasions.[3] Big rainstorms are usually heralded by a sudden change in wind direction from south-west to an easterly point, and a smell of rain in the air. This easterly wind is often very strong, and may be violent enough to blow down trees and damage houses. In 1957 a gust of 105 miles an hour was recorded, and during this storm some roofs of well built houses were blown off. These storms coming from the east are associated with the Inter-Tropical Convergence Zone. It usually rains at night, and but rarely during the day. In the late afternoon clouds may often be seen building up ominously. Frequently the heavy storms are accompanied by much thunder and lightning. With these storms the streets may become flooded as the drains are unable to carry away the silt laden water quickly enough. In July these drains are dug out in preparation for the rainy season and are filled in again

[3] Khartoum's record fall in one day (1921-50) was 3 inches on the 17th of August 1935.

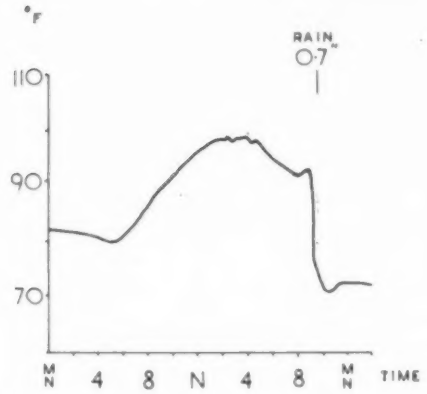

FIG. 6. Thermograph record for a rainy day in August 1957.

Note: 1. Because of the rain the temperature dropped 23°F. in less than an hour. 2. The slight rise in temperature before the rain was caused by the typical strong wind experienced before a heavy storm. 3. The narrower temperature range of only 18°F. of the previous day which is typical of the rainy season.

by the time the season ends. Every year Khartoum, and more especially its neighbour Omdurman across the White Nile, has its "crop" of collapsed houses as so many of the people live in houses built of mud-bricks. However not all the rain comes from this type of storm. Most of the less violent storms are purely convectional in character.

A heavy storm causes a sudden drop in temperature which is most welcome (Fig. 6). Its effects on the temperature may be perceptible for two or even three days. Light rains are often no relief at all as they bring the temperatures down but little, and cause a higher relative humidity, which can be unbearable.

In years of good rainfall a journey into nearby areas will reveal farmers busily planting *dura* (millet) on the unirrigated land. In other years it is not worth the effort and they confine themselves to their riverside holdings which can be irrigated. This valuable land is mainly used for growing vegetables and fruit to sell in the Three Towns of Khartoum, Khartoum North, and Omdurman. In these years they will purchase *dura* which has been grown in the more rainy areas in the Sudan.

SHORTER HOT, DRY SEASON

By the middle of September the rains have usually departed, and there is for the next month or so a season similar in many

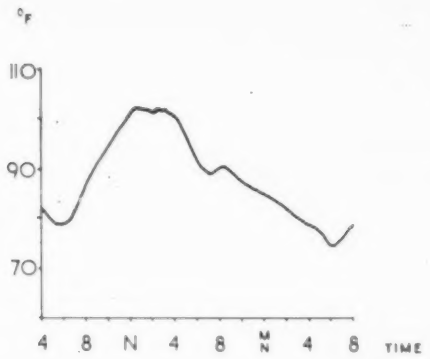

FIG. 7. Thermograph record for an October day in the shorter Hot, Dry Season of 1957.

Note: 1. Rapid cooling off between 4 and 7:30 p.m. due to the intense stillness of the atmosphere. The rise in temperature after 7:30 was due to the cool air being disturbed by a warm wind blowing off the desert. 2. The diurnal range of temperature (27°F.) is greater than in the rainy season (Fig. 6), but less than in winter (Fig. 4).

ways to the earlier hot, dry season; it is however shorter. The temperatures do not usually reach such heights, tho 105°F. maximum day shade temperatures are not uncommon. This season is associated with the movement southwards of the overhead sun, the disappearance of the rains, and the re-appearance of cloudless days. During this period the damp air coming from the south-west causes high humidity, and this air is gradually replaced by dry northerly air. The arrival of this northerly air is most welcome, because of its lower humidity, and because it heralds the delightful winter season. In many simple ways the difference can be observed. A glass of cold water from the refrigerator if placed on the table will immediately have a considerable amount of water deposited on it when the south-west wind is blowing, but hardly any moisture at all will be deposited during the north-east wind. Again, because of the general shortage of moisture here, gardens are irrigated about once a week. When the north-east winds blow the water dries up more rapidly.

This season of indeterminate winds is characterised by intensely calm evenings, such that it is quite possible to play a game of badminton in the open air with the lightest of shuttlecocks (Fig 7).

From now onwards both daytime and night temperatures gradually fall and the daily temperature range increases. Fans which have been in use almost continuously during the daytime since March can be turned off. "Winter" has returned.

A TEACHING UNIT ON THE POLAR REGIONS

SALLY FULLER
Ellensburg, Washington

I have here outlined a project of study on the polar regions for 6th grade students, to continue for approximately 3 weeks of daily lessons. This project is considered to be in the social studies and science areas since it touches upon the subjects of meteorology, geology, geography, history and political science.

My justification for emphasizing these areas on the upper intermediate level is, largely, that these once exceedingly remote regions, so little known and of so little influence on the known world, are becoming more and more prominent in today's news stories. Air passengers fly on schedule across the Arctic Circle from Seattle to Oslo. And in the Antarctic a notable international cooperation has, this last year, resulted in the gathering of much worthwhile scientific information on that fabulous continent. So the polar regions, both North and South are stirring public interest and claim an earlier and more thoro coverage in our schools.

Another justification is based on the fact that upper intermediate children are highly interested in adventure and exploration, in science and in true events. The heroism of early polar expeditions, the fascination of geographic extremes, and the timeliness and usefulness of scientific data now being collected on Antarctica during the International Geophysical Year, should appeal greatly to these children.

Objectives

The main objectives of this study should be, I feel, the students' understanding of:

1. the effect of the earth's inclination on the poles.
2. the outstanding geographical facts of both polar regions: climate, sea, ice, and land masses.
3. the adaptation of life to polar environment.
4. the growing importance of polar regions to the world's scientific knowledge.
5. the more outstanding explorations of the polar regions.

And the students' appreciation of:

1. the tremendous courage required in exploration of these areas.
2. the beautiful and terrible and fantastic character of these areas.

SUBJECT MATTER OUTLINE

This unit of study should not necessarily be taught in the order of the following outline. The teacher will probably have his own feelings about the sequence of lessons, and of the use of the suggested activities in relation to these outline topics. It is important that the teacher be thoroly acquainted with the subject matter, so I have listed some useful references. There is a tremendous amount of literature available on these regions, so the problem appears to be that of selecting what information would be most interesting, timely, and valuable to the children, for teaching within the alloted time.

I. Both polar regions
  A. Location
    1. Area around axis points ("tree line" in Arctic)
    2. "Arctic" and "Antarctic"—derivation of names
  B. Effect of earth's inclination
    1. Midnight sun; winter dark
    2. Extreme cold
  C. Likenesses and differences
    1. 14,000 ft-deep sea at North Pole; 9,000 ft-high plateau at South Pole; 5 million sq. mi. continent
    2. Icebergs: jagged in Artic; flat in Antarctic
    3. Glaciers: Ice caps on Greenland, Antarctica
    4. Life: North—half million people live within 1,000 mi. of pole; forests, mining, bears, seal
       South—no tree or settlement within 1,000 miles of pole; penguins, whale, seal

II. North Pole
  A. Land and sea characteristics
    1. Ice and icebergs
    2. Temperature
    3. Land surrounding
  B. People
  C. Animal plant life
     (very interesting adaptations to environment)
  D. Explorations
    1. Vikings, Henry Hudson
    2. Greely reached 83°-84° in 1881. Many starved. (Pole is 90°)

3. Nansen in 1893 expected to drift over pole
4. Peary tried from 1893 on; land trips on Greenland; difficulties of using ships; travelling on ice; reached pole in 1909
5. Byrd and Bennet fly over pole

III. South Pole

A. Antarctica

1. Size Europe and Australia together; 3 million sq. mi. unexplored
2. Temperatures of more than 100° below freezing; compare to Arctic
3. Active volcanoes; "nunataks"
4. Ice pack extends hundreds of miles north
5. 90% of earth's total ice cover on Antarctica
6. No plant life except lichen, moss; once covered with forests
7. Example of what happened to North America and Europe before civilization
8. Ross Ice Shelf 700 ft. thick, 400 ft. wide, afloat

B. Animal life: whales, seals, penquins, plankton

C. Exploration

1. Sealing, whaling era, expectations of colonization (Smith; Enderby Bros; Wedell)
2. First scientific explorations sought magnetic pole (Ross, British; Wilkes, American)
3. Ships caught in ice—one a whole year
4. Swedish party wintered ashore 1903
5. Scott first inland; Shackleton to 112 mi. of pole
6. Scott tragedy; Amundson to pole
7. Shackleton adrift on pack; boat to South Georgia
8. Air age; Byrd 1928 extensive explorations (Paul Siple, Boy Scout with Byrd, became expedition leader, now important scientist in Deepfreeze); Wilkins 1928 first to fly; hops over Palmer Peninsula; Ellsworth 1929 first to fly across Antarctica (Palmer Penin. to Ross Ice Shelf)
9. Other exploration: U. S. "Operations"

D. Operation Deepfreeze

1. Preparations 1954-57: aircraft, helicopters, tractors, 9 ships, hundreds of people, pre-fabs

2. 1957-58 Deepfreeze; 6 U. S. stations, 100 scientists

E. Importance

1. Strategic 2. Economic 3. Scientific

IV. International Geophysical Year and Antarctica

A. First Polar Year 1882-83

1. 12 nations: data for full year at 14 Arctic posts, 34 others
2. Repeated at Antarctica 1902-03

B. Second Polar Year 1932-33

(49 nations, observations all over earth)

C. The I. G. Y.

1. Supported by Unesco, 52 nations
2. 21 stations in Antarctica

D. What scientists and explorers hope to learn from Antarctic investigations this year

1. Peculiarities of "Aurora Australis" (Southern lights): appearance, frequency, compare to northern lights
2. How does atmosphere above Antarctica fit in (if it does) with rest of earth's atmospheric circulation
3. How much is ice and snow, how much is land on Antarctica; other topographical information; some think continent is two land masses
4. Influence of ice and snow masses on climate
5. Nature of the ionosphere over Antarctic in winter; compare to Arctic
6. Behavior of glaciers: are they shrinking in Antarctica as in northern hemisphere? Measurement of ice thickness
7. Are ice caps melting? Will level of ocean be raised if they are? How fast? How much?

E. Commonwealth Expedition

1. Independent enterprise
2. Fuchs-Hillary, Weddell Sea to Ross Sea

SUGGESTED ACTIVITIES

A. Demonstrations

1. In a darkened room teacher shows revolution of earth (a world globe on inclined axis) around the "sun" (a bright lamp) to demonstrate how polar areas can be dark for several weeks. Let each child move the earth in its "orbit." Point

out how equator is always closer to sun, poles always farther, colder.

2. An ice chunk in a glass bowl of water; how little ice shows above surface in relation to submerged.

B. Films

1. There are at least three 16 mm cataloged films which concern the Arctic: "North of the Arctic Circle"—Laplanders, reindeer heards, birdlife (25 min., sound, color).
"North Pole"—early explorations, present activities, Thule (11 min., sound, color).
"Arctic Borderland in Winter"—emphasizes adaptation of plants and animals to unusually difficult living conditions (10 min., sound, b & w).

3. Sullivan (*Quest for a Continent*) tells of a film made after World War II about Scott's expedition to the South Pole. This might be interesting. Maybe too harsh for children—Sullivan says "nothing was spared to make it realistic."

C. Map Exercises

Locate Arctic and Antarctic circles
Identify Arctic territory. Show why Arctic is of such critical importance internationally.
Plot airplane Arctic "polar routes" of air-passenger planes
Locate (among other places):
Ross Ice Shelf and Ross Sea
Wedell Sea
Palmer Peninsula
Magnetic pole area
Route of Ellsworth's flight
Little America

D. Secure display of some polar expedition equipment, or at least of some clothing of the type Navy wears in Antarctica.

E. Make class scrapbook of newspaper and magazine pictures and articles concerning polar news and information, particularly during I. G. Y. winter (1957-58), which is summer in Antarctica. The Fuchs-Hillary "race to the pole" was big news—perhaps old magazines were saved.

F. Individual reading, book reports; for instance:
Owen, *The Conquest of the North and South Poles*, Random House, 1952. Very easy reading. Note, however, even now out of date concerning Antarctica. Freuchen, *The Arctic Year*,

Putnam, 1958. Lots about people and animals. Too long and hard to read completely, but good for research.

G. A student report on the Scott expedition in Antarctica. Tragic, heroic. Scott's diary might be heavy going for a sixth grader but parts of it would be thrilling. There's something very moving about reading exact words of history-making writings—some advanced children should begin to appreciate this.

H. A student report on the Commonwealth Expedition. This will provide opportunity to learn skills and pleasures of newspaper and magazine research.

I. A bulletin board on penguins—just for fun! They are so interestingly adapted to their cold home.

SELECTED BIBLIOGRAPHY FOR TEACHERS

Buedeler, Werner, *The International Geophysical Year*. Unesco, Paris, 1957 (pamphlet).
Fraser, Ronald, *Once Round the Sun*. Macmillan, 1957.
Owen, Russell, *The Conquest of the North and South Poles*. Random House, 1952.
Sullivan, Walter, *Quest for a Continent*. McGraw-Hill, 1957.
Dufek, George J., *Operation Deepfreeze*. Harcourt Brace, 1957.
Meyers, Walter E., *Eskimo Village*. Vantage Press, N.Y., 1957.
Freuchen, Peter and Salomonsen, Finn, *The Arctic Year*. Putnam, 1958.
Newspapers, magazines (particularly *Life*) of 1957-58. See Antarctica, and IGY in Readers Guide.

GEOGRAPHY QUIZ BOOK

JAMES K. ANTHONY
Southern University, Baton Rouge, Louisiana

In recent years the public has seen the rise of many quiz programs on television with an inestimable amount of free education dispensed to all concerned. Altho the prizes were won by only a few aspirants, everyone, participants and non-participants alike, emerged richer in one way or another. Teachers may take a cue from these programs on how to improve their class instruction or to develop interest-stimulating devices in the form of a geography quiz book.

In a loose-leaf notebook pictures of the desired subjects are mounted two, three, or four to a page, depending upon their size. Suitable space should be provided for a short caption of a line or two about each. For example, a picture of an erupting volcano

might have the following statement: In 79 A.D. two Roman cities were destroyed when a volcano erupted. What is the name of the volcano? The answer, of course, is Vesuvius and the name would be written on the blank line which follows the statement. Another picture might show Mt. McKinley in Alaska and have the following caption: This is the largest mountain in the United States. What is its name?

Maps of many of our states are featured on post cards. One may place two such cards on a page and ask for the "nickname" of each state. For variation, the leading products might be requested or even the motto—depending upon the general knowledge of the students. Pages devoted to the silhouettes of states and countries provoke interest. A typical question about California might be: What fertile valley in this state is world famous for its year-long growing season? Several answers are correct, but perhaps the Imperial Valley is best known by people living outside the Pacific states. A caption about Colorado might be: The captial of this state is over 5,280 feet or a mile in elevation. What is it? Or for Mississippi the caption might read: The world's largest center for the canning of oysters is located in ————. The students would be expected to answer "Biloxi."

The identification of capitol buildings may be a source of added interest. Louisiana has a skyscraper-type of a building, whereas Ohio has a two-story structure with a turret-type dome. A variety of questions may be asked about these buildings. For example, in what cities are these two buildings located? (Caution: many state capitols are modified replicas of our national capitol and should not be used.) The buildings of Parliament in London, as well as those of Ottawa, the political structures of Red Square in Moscow, and the famous buildings of the United Nations in New York all have possibilities of thought-provoking questions.

Another interesting section of the scrapbook can be given over to the identification of pictures of men and women who have distinguished themselves in the field of geography. Below the pictures of Alexander Humboldt might be placed the following caption: A famous ocean current is named after this man. What is his name? Roderick Peattie, the incurable romantic, could be described as an editor of a series of books on mountains (on which he was an authority) as well as author of textbooks on geography, maps, and numerous articles.

If one is an amateur photographer, he may take pictures of objects that will be included in his quiz book. Newspapers and magazines present an inexpensive source for collecting pictures which may be culled from both the content and advertising pages. A hidden wealth of ideas may be garnered from one's delving into his post card collection and thoughtfully-worded questions may also be asked about pictures portrayed on postage stamps.

A variation of the above ideas would be to have the students make their own quiz books with teacher supervision. Then have them exchange their books with one another, thus creating a new educational "learning-by-doing" device. The teacher should be ever-mindful of the extent of a student's knowledge and gear the work accordingly.

BULLETIN BOARDS IN GEOGRAPHY

JAMES R. SMITH
Marquette, Michigan

Are your bulletin boards being used to their best potential? Or are you like many of us who fail to employ these eye catching areas to their best advantage?

Bulletin boards can go to work for you at very little cost and effort. They will perform a job of instruction merely thru their presence in your classroom. They can be arranged to stimulate action.

Action bulletin boards can be constructed from any of several basic materials, such as colored construction paper, bristol board, and tag board, to mention only a few. Other materials which should be a part of your inventory are pipe (smoking) cleaners, brass fasteners, colored buttons, cord, colored twine, drinking straws, cotton batten, rubber cement, and paints.

How can action be shown on bulletin boards? This can be done thru the use of arrows, dots, triangles, pipe cleaners, the pointed finger of a hand and by means of incorporating the idea of movement in cutting and coloring your models. The climatic principle of "rain-shadow effect of mountains" serves as a good illustration of how motion can be shown on bulletin boards.

Construction of a Rain-Shadow Board

First make a layout sketch of all needed parts in their proper size and shape on either newsprint or manila paper. Cut out the stencils from the paper, and assemble them in their respective positions. Next, select the colored construction paper which best suits the needed parts. Place the stencils on the construction paper

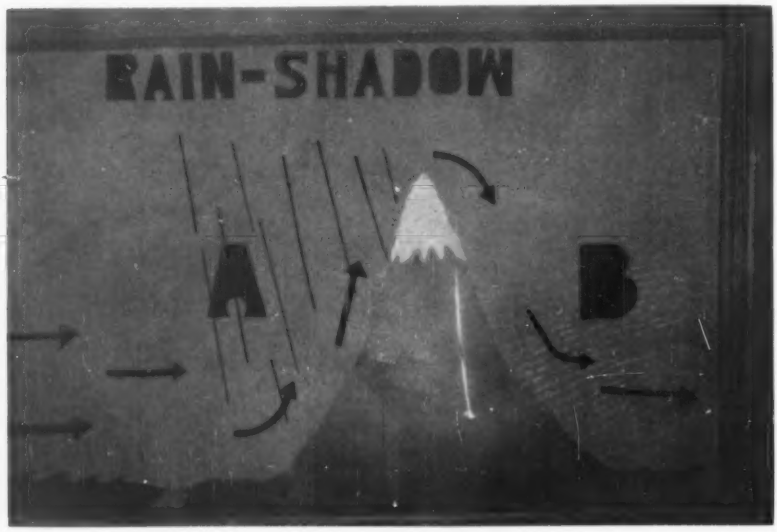

Fig. 1 Ocean winds blowing against mountain ranges are forced to rise. As they ascend they cool, clouds form, and rain falls. When the winds break over the crest and descend, their temperature increases and they absorb moisture. Regions on the leeward sides of mountain ranges lying in the path of prevailing winds are apt to be dry and are said to be in the "rain-shadow" of the mountains.

and make a pencil tracing of each piece. Using sharp scissors, cut the layout pieces from the paper. If you use bristol board or tag board, you will need heavy scissors or a knife to do the cutting. Paint each piece with appropriate colored poster paint before assembling. Place the layout pieces on a large flat surface, upside down, and fasten them together with masking tape. You are then ready to place the fastened section on the bulletin board. The next step to follow is the selection of symbols to denote action. In our "rain-shadow" board we will use straight and curved arrows made of sharply contrasting colors (Fig. 1).

THEIR USES AND VALUES

Boards depicting action can be used in many phases of teaching. Used properly, they are a very effective means of creating interest when put in operation prior to the undertaking of a new unit. This type of display can also be made and presented by a group of students in the class as the culmination of a unit. They are particularly useful in teaching new technical terms, and lend themselves especially well to the teaching of geography, a subject which commonly involves the idea of motion and the interaction of natural or cultural geographic forces or processes. The writer has used these displays, for example, to illustrate the operation of ore docks, smelters, grain elevators, sulfur mining, underground ore mining, ship locks, and the principles of climate and weather behavior.

Bulletin boards depicting action should be carefully planned prior to their use, and the teacher should be well informed on their proper construction. They should be made well in advance of their use so that they will be available when needed. Displays of this type, like all bulletin boards, must be eye-appealing. They must not be beyond the level of understanding of the pupils for whom they are intended. Caution must be used to make all essential objects large enough so as not to create any uncertainty as to their meaning. The teacher should introduce these displays at the psychological moment when pupil interest in the topic is at its peak.

It is recommended that you maintain a filing system using manila folders or packets to store the completed boards and materials. The experience of many teachers indicates that once you begin to indicate action on boards, they will become one of your most effective teaching techniques.

INDEX TO THE JOURNAL OF GEOGRAPHY

Do you have an *Index* available in your library for your 1959 students? The *Index* saves hours of time and is indispensable to college teachers who are guiding potential teachers. If interested in knowing more about this and other publications of the National Council for Geographic Education, write to Professor John W. Morris, Publications Division, National Council for Geographic Education, Department of Geography, University of Oklahoma, Norman, Oklahoma.

NATIONAL COUNCIL AT WORK

PRELIMINARY PROGRAM

THE NATIONAL COUNCIL FOR GEOGRAPHIC EDUCATION

Forty-fifth Annual Meeting

Sheraton-Cadillac Hotel, Detroit, Michigan, November 27, 28, 1959

Theme: *OUR EDUCATIONAL ENVIRONMENT AND GEOGRAPHY TEACHING*

Pre-Convention Events Thursday, November 26, 1959

9:00 a.m. Planning Committee Meeting ..... **President's Suite**

Participants, Chairman, 3 immediate past Presidents, President, First Vice-President, and Secretary

1:30 p.m. Field Trip

Dr. Robert Nunley, Conductor Cultural Geography in the Detroit-Windsor Area

2:00 p.m. Executive Board Meeting ..... **Parlor C**

4:00-9:30 Registration and Information Desk in operation ..... **Elevator Lobby**

9:00 p.m. Executive Board Meeting ..... **Parlor C**

NOTES: Press Room ..... **Parlor D**

Exhibits ..... *Founders Room*
Exhibits may be set up any time after Thursday noon

Geographical Movies ..... *Normandie Room*
Chairman, Dr. Robert Goodman. Movies will be shown during sectional meetings and between sections but not during general sessions.

FRIDAY, November 27

9:00-10:45 a.m. First General Session ..... **Grand Ball Room**

Presiding ..... A. K. Botts
President, National Council for Geographic Education, State Teachers College, Trenton, N.J.

Welcome to Detroit
Representing the Honorable Louis C. Miriani, Mayor, City of Detroit

Greetings ..... Lynn C. Bartlett
State Superintendent of Public Instruction, Lansing, Mich.

Greetings ..... Samuel M. Brownell
Superintendent of Public Schools, Detroit, Mich.

Greetings ..... Eugene Elliott
President, Eastern Michigan University, Ypsilanti

Response ..... Mary Viola Phillips
Past-President, National Council for Geographic Education

Orientation: DYNAMIC DETROIT—YOUR HOST COMMUNITY

11:00 a.m.-12:30 p.m. Sectional Meetings

A. Session to be arranged by Dr. Brown involving teachers in Detroit, Ypsilanti, and Ann Arbor area ..... *Pan American Room*

B. REGIONAL GEOGRAPHY, SOUTHEAST ASIA ..... *Crystal Room*
Presiding ..... Thomas Frank Barton
Editor, JOURNAL OF GEOGRAPHY
A North Indian Village ..... Charles Edwin Weber
Indiana State Teachers College, Indiana, Pa.
Malaya and Mainland Southeast Asia ..... L. A. Peter Gosling
University of Michigan, Ann Arbor, Mich.
Burma's Search for an Independent Economy ..... Robert R. Drummond
Indiana State Teachers College, Terre Haute, Ind.
Outlets to the Sea for Land-locked Laos ..... Thomas Frank Barton
Indiana University, Bloomington, Ind.

C. REGIONAL GEOGRAPHY, UNITED STATES ..... *Reception*
Presiding ..... Robert Funderburk
Central Washington College of Education, Ellensburg
Hawaii ..... Elizabeth Eiselen
Wellesley College, Wellesley, Mass.
Alaska's Largest Eskimo Village ..... Melvina Svec
University Teachers College, Oswego, N.Y.
Flint—The Work We Live ..... Benjamin Moulton
Flint Junior College, Flint, Mich.
Expressways and Traffic Flow Studies in Detroit ..... Marjorie Smith Goodman
University of Detroit, Mich.

D. Film Program ..... *Normandie Room*

12:30-1:45 p.m. Lunch Period

1:45-3:00 p.m. Second General Session ..... Grand Ball Room

Presiding ..... John W. Morris
First Vice-President, National Council for Geographic Education, University of Oklahoma, Norman
Our Educational Environment ..... M. G. Bowden
Principal, Casis School, Austin Texas
The Teaching of Geography ..... Neville V. Scarfe
Dean, College of Education, The University of British Columbia
New Developments in Geographic Education ..... Wilhelmina Hill
Specialist for Social Science, Department of Health, Education, and Welfare

3:15-4:30 p.m. Sectional Meetings

A. STATE ACTIVITIES IN GEOGRAPHY IN EDUCATION OF SPECIAL INTEREST TO STATE CO-ORDINATORS ..... *Pan American Room*
Presiding ..... Herbert H. Gross
Concordia Teachers College, River Forest, Ill.
The Minnesota Plan ..... Hildegard Binder Johnson
McCalester College, St. Paul, Minn.
The Minnesota Method ..... John Borchert
University of Minnesota, Minneapolis

The Status of Geography in the Public Junior Colleges of Michigan Earl J. Seninger
Flint Junior College, Flint, Mich.
Backgrounds of Academic Preparation of Social Studies Teachers in the High Schools of Kansas .....

B. Interdisciplinary Relations ..... *Reception Room*
Presiding ..... Leonard I. Kuntz
University of Pittsburgh
The Maxwell School—Syracuse ..... Albert Brown
Eastern Michigan College, Ypsilanti
Content and Purpose in Introductory Courses in Geography ..... Charles W. Boas
Michigan State University, East Lansing
Geography in the Post-Modern World ..... Daniel Jacobson

C. Geography at the Elementary Level ..... *Sheraton Room*
Presiding ..... Philip Bacon
Teachers College, Columbia University, New York City
Grade Placement Emphasis ..... Berenice Casper
Trenton State College, Trenton, N.J.
Interrelationships Between Man and the Natural Environment for Use in the Geographic Strand of the Social Studies Curriculum ..... Malcolm P. Douglass
Claremont College, Claremont, Calif.
Elementary School Map Skills ..... Harriet Chase
Public Schools, Harwich, Mass.
Map and Globe Usage in the Grades and High School ..... Ruby Harris
Educational Consultant, Rand McNally Co., Chicago

D. Future Teachers of Geography ..... *Parlor C*
A program for undergraduates

E. Film Program ..... *Normandie Room*
Presiding ..... Robert J. Goodman
Wayne State University, Detroit, Mich.

4:45-6:00 p.m. RECEPTION at McGregor Memorial Conference Building, Wayne State University, Detroit, Mich.

(Direct bus service from the hotel to McGregor Memorial and back will be provided. Refreshments for this reception are provided through the courtesy of Scholastic Magazines.)

7:00 p.m. Annual Dinner ..... Crystal Ball Room

Presentation of Awards
Address:
The St. Lawrence Seaway ..... Harold M. Mayer
Department of Geography, University of Chicago

SATURDAY, November 28

8:00 a.m. COORDINATOR'S BREAKFAST ..... Sheraton

Presiding ..... Herbert H. Gross
Director of Coordinators, National Council for Geographic Education, Concordia Teachers College, River Forest, Ill.

9:30-10:45 a.m. Third General Session ..... **Crystal Ball Room**

Presiding ..... John W. Morris
First Vice-President, National Council for Geographic Education

College Geography in the United States ..... J. R. Schwendeman
University of Kentucky, Lexington

The Next Step for Geography in Our Schools ..... Clyde Kohn
State University of Iowa, Iowa City

Experimental Educational Television and Geography Teaching ... Howard H. Flierl
New York State College for Teachers, Albany

11:00 a.m. Thirteenth Annual General Assembly ..... **Crystal Ball Room**

(Attendance restricted to members)

Presiding ..... Adelbert K. Botts
President, National Council For Geography Education, Trenton State College, Trenton, N.J.

Review of Our Forty-Fifth Year ..... Lorrin Kennamer
Secretary, National Council For Geographic Education, University of Texas, Austin

Financial Report ..... John H. Garland
Treasurer, National Council For Geographic Education, University of Illinois, Urbana

Report of Planning Committee ..... Henry J. Warman
Clark University, Worcester, Mass.

Report of Resolutions Committee ..... Robert Ramsaur
U.S. Air Force Academy, Denver, Colorado

Report of Nominating Committee ..... George T. Renner, III
Arizona State College, Tempe

Prospects for 1960 ..... John W. Morris
President-elect, National Council For Geographic Education, University of Oklahoma, Norman

12:30 p.m. FIELD TRIPS

Robert E. Nunley, Conductor
The trip conducted Thursday afternoon will be repeated Saturday afternoon.

BOOK REVIEWS

J. Stanley Clark. **The Oil Century—From the Drake Well to the Conservation Era.** University of Oklahoma Press, Norman, Oklahoma, 1958. 280 pages. $3.95.

The Age of Petroleum which began on August 27, 1859 is now approaching the end of its first century. This is the story of oil and of the industrial and social transformations which it has effected during the past hundred years.

This is a compact book presenting the leading events in the development of the conservation policies of the oil industry thru the years. The first 125 pages are devoted to the industry prior to 1900. Sections are included on Drake's folly, developments of the early industry along Oil Creek, contemporary accounts of the Pennsylvania oil boom period, early transportation, and speculation in the oil region.

In the early years of the industry many policies of exploitation were developed. One of the most important of these was the "rule of capture." With the great expansion of production since 1900 there has been increasing need to obtain maximum recovery of oil from the reservoirs. The last 130 pages are devoted to the growth of modern conservation policies. Chapters treat economic waste, experiments in controlled production, conservation thru co-operation, and technological advances as a means of conservation. The volume concludes with a discussion of the place of imports in supplying the oil demand of the United States.

There are 16 pages of excellent photographs, many on the early oil industry. The historical evolution of oil conservation is analyzed most effectively in this volume.

The Pennsylvania State University E. Willard Miller

Olin T. Mouzon. **International Resources and National Policy.** Harper & Brothers, 49 East 33rd Street, New York 16, New York, 1959. 711 pages with bibliography and index. $7.50.

This new text, despite obvious differences in objectives and approach compliments an earlier and widely-accepted book by this publisher, Zimmermann's *World Resources and Industries*. Altho both books are functional in treatment, Mouzon subordinates function to policy. It is a world view only in the sense of a frame of reference for U.S. policy determination. The author states that the over-all plan is to present a minimum of facts bearing on production problems requiring national policy decisions, discuss the policy, then give conclusions and recommendations. The book does just that.

The organization is by orthodox factors of production: land, labor, capital, and government, but the treatment is geographic as well as economic. The conditions under which crops are grown, minerals are mined, or products manufactured are treated lightly; areal distribution is emphasized. For instance, there are 40 pages devoted to agricultural production, excluding animals (but generously mapped and tabled), 147 pages are given to the international trade in agricultural products. Understandably, manufactured steel, copper, aluminum, power, and the mineral resources are more generously treated. Unit 3, dealing with political factors is perhaps the most cogently written section.

The major shortcoming seems to this reviewer to be the emphasis upon production at the expense of markets and their role in policy-making. However, the faults of this book are minor, while the virtues are major. It belongs, with Zimmermann, on every college geographer's bookshelf.

The Ohio State University Alfred J. Wright

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BOOK REVIEWS

Fanny Davis. **Getting to Know Turkey.** Coward-McCann Inc., New York City, 1957. pp. 1-64. $2.50.

Getting to Know Turkey is the story of a country that became a republic 30 years ago, emphasizing the progress which the people have made in the ensuing years.

In its brief survey of Turkey the reader is taken from the earliest known history to the present. Considerable space is devoted to the reforms instituted by Ataturk, the first president of Turkey, which were basically social, cultural, economic, and educational.

There is a brief discussion of the agriculture comparing the old and new concerning the raising of angora goats, cotton, wheat, figs and tobacco. In addition their reference is made to mining, industry, children's folk lore, and music.

In the latter portion of the book the religious customs are presented, as well as information relative to Istanbul, both old and new, with emphasis placed upon the historic sites. The book closes with a description of the present government, and the place that Turkey has taken in world defense as a member of NATO.

The illustrations in black and red do not add to the text. The drawing techniques employed does not convey the Byzantine influence which is characteristic of the architecture. The single map is adequate for its purpose, but in error relative to proportion and adjacent countries. In other instances the illustrations are interspersed with the printed material making reading difficult.

Within the text repeated references are made to the United States and the role which it played in assisting Turkey to establish itself as a republic. The reviewer would recommend this book as supplimentary reading for children of the intermediate grades (4-6).

DAVID L. ZUFFELT

State University, Teachers College
Geneseo, New York

Freda M. Buchanan. **The Land and People of Scotland.** J. B. Lippincott Company, East Washington Square, Philadelphia 5, Pennsylvania, 1958. 128 pages with table of contents, index, photographs, and map. $2.95.

William Spencer. **The Land and People of Turkey.** J. B. Lippincott Company, East Washington Square, Philadelphia 5, Pennsylvania, 1958. 128 pages with table of contents, photographs, index, and map. $2.95.

These two small books pack a great amount of information into a small amount of space. In so doing, a great deal of stereotyping results. Geographers will wince at certain terminology, such as referring to wheat and olives as natural resources. There is a need for more and better maps since there is a continual reference to place names.

Despite these and other minor shortcomings, the books have much to recommend them. Each contains portraits in miniature of a wide variety of natural features, economic activities, historical events, and customs of little-known countries. The material included is well chosen and the style is well adapted to the age group for which it is intended—junior high school. The series of pictures shows a fair cross section of the life in each country.

These books will find their greatest value as supplementary reading for a unified social studies class. Teachers at all levels will also find them useful sources of vivid sidelights on the history, culture and geography of two interesting countries.

Walter H. McDonald

Eastern Illinois State College
Charleston, Illinois

Clyde F. Kohn. **The United States and the World Today.** Rand McNally & Company, P.O. Box 7600, Chicago 8, Illinois. 1957. xiii and 254 pages. $3.50.

"The United States and the World Today" contains material presented and developed in a Workshop in Geography sponsored by the Rand McNally Company and held at Northwestern University in the summer of 1956 under the combined auspices of its School of Education and Department of Geography. Dr. Clyde F. Kohn was the director of the workshop and edited the book.

Part I of the book consists of lectures given by ten geographers on the current relationships of the United States in world affairs. Preston E. James discusses four basic trends in the postwar world: (1) increase in capacity to produce goods, (2) atomic power for peaceful purposes, (3) spread of demand for equality among people, and (4) shifts in the power structure of the world since 1945. Harold H. McCarty states that significant developments in the United States since 1945 are changes in population, occupations and incomes which have occurred, and mentions that the value of manufacturers exceeds that of agriculture in most states except those in the Mountain region. The next eight chapters consist of lectures on the new relationships of the United States with other world regions. Mason Wade writes on Canada, Clarence F. Jones, on Latin America, Arthur E. Moodie on western Europe, Philip L. Wagner on the U.S.S.R., Edward B. Espanshade, Jr., on the Middle East, Donald R. Petterson, Central and South Africa, Norton Ginsburg, the Asiatic Triangle, and Charles M. Davis on the South Pacific Land. Students and others will find these lectures to contain concise information about the regions and their postwar relationships to the United States.

Part II consists of the conclusions of eight workshop committees, each made up of several teachers of geography at different levels, who investigated the following areas of instruction: nature of geographic learning, sequential development in geographic learning, making provision for geographic learning, instructional techniques, unit method in geographic learning for the intermediate grades, unit method in geographic learning for high schools, resources and equipment for geographic learning, and the measurement and evaluation of geographic learning. The chapters prepared by the workshop committees present much interesting and useful information for teachers of geography.

Otis W. Freeman

State Teachers College
Indiana, Pennsylvania

George W. Hoffman and Viola Hoffman. **Austria.** The Fideler Company, Grand Rapids, Michigan, 1958. 160 pages with illustrations, glossary, index, and table of contents.

This addition to the *Life in Europe* series is planned to supply an attractive and informative reference for upper elementary students of varied reading ability. Less capable readers will be stimulated by the simple captions for the abundance of large, clear, interesting black and white photographs which show, primarily, modern Austrians at their daily activities altho the scenic and picturesque are not neglected. These readers, too, will find the maps of agricultural and mineral products, industries and transportation facilities exceptionally clear and meaningful. The map of the inner city of Vienna is particularly encouraging to youthful map-musers.

Text is well written with pertinent illustrations following it exactly. Geographic terms are used in meaningful context and frequently repeated. Repetition is also achieved thru references both in text and in review exercises for using maps and pictures for additional information. Good organization keeps this from being too disruptive of continuity and attention; however, there are several frustrating instances of a lack of page numbering. Brief but inclusive chapters supply motivation for the stimulation of superior students to do independent research into Austria's contribution to art, music and European history.

A valuable feature is an excellent glossary of over 150 terms, pronounced phonetically, and very adequately explained. Reference to the glossary is indicated by asterisks in the text. Except for the capital city, which nowhere appears in its local spelling, all proper nouns are given the German pronunciation.

This book would make a good addition to the schoolroom library.

State University of New York WILMA LAUX
College for Teachers, Buffalo

Jacob H. Schiel. **Journey Through The Rocky Mountains and the Humboldt Mountains to the Pacific Ocean.** Translated and edited by Thomas N. Bonner. The University of Oklahoma Press, Norman, Oklahoma, 1959. 111 pages with index. $3.75.

This is a translation of an extremely rare book published in Germany in 1859. Dr. Jacob Schiel, formerly of the University of Heidelberg, accompanied the Gunnison Expedition of 1853-54 as geologist-naturalist and surgeon. The expedition was sent out from Westport, Missouri, to explore possible railroad routes to the Pacific. Schiel's book was a narrative of his experiences designed for German readers but included many of the observations which formed the basis of the official report of the expedition. The original work has been ably translated and edited by Dr. Bonner, Head of the University of Omaha's Department of Social Science, and appears as the 27th volume in the American Exploration and Travel Series of the University of Oklahoma Press. The Editor's Introduction is useful in establishing frames of reference for Schiel's narrative and in pointing out inconsistencies and errors in the text.

Schiel may not measure up to Humboldt and Darwin, but nevertheless he demonstrates an amazing comprehension and appreciation of the landscape for his time. His keen observations on such diverse topics as stratigraphy, climatology, plant ecology, and social institutions mark him as a man of depth and versatility. His descriptions of the Great Plains and Great Basin are especially noteworthy.

This rather handsome volume should be considered primarily as an interesting document now made available in English. It may have some practical value to historical geographers, however, particularly in its discourse on the Utah Mormon colonies.

The Florida State University BURKE G. VANDERHILL

Erick Berry. **The Land and People of Finland.** J. B. Lippincott Company, East Washington Square, Philadelphia 5, Pennsylvania, 1959. 126 pages with index, illustrations, and table of contents. $2.95.

This is one of a series of books called "Portraits of the Nations," which purports, "to give young people compressed, authoritative and interesting profiles of the land, history, geography and life of our neighbor nations." Twenty-seven volumes have already been published, and others are in preparation.

The author introduces many important aspects of both past and present Finland in a manner which should whet the appetite of the reader to find out more about this northern land and its people. The brevity of the book means that the topics covered in any detail are highly selective. The discussions of the Lapps and Lapland and the descriptions of Helsinki and Tampere are the most geographical portions. The author does an admirable job of conveying to the reader the unique character and "flavor" of Helsinki as a city.

Other topics treated in some detail are the historical relations of Finland to Sweden and more particularly Russia; the magic role on Finnish life of the Kalevala, a collection of early Finnish runes or poems; the meaning of sports especially the Olympics to the people; the culture of Finland as expressed in castles and various people forms of art; and the importance of Nurmi, Sibelius, Mannerheim, and the Saarinens.

Emphasis is upon the "people" at the expense of the "land." Livelihood activities of the Finns are alluded to here and there but no cohesive picture of the economy is given. Many other items could have been covered, but the stimulated student or layman can find other adequate sources on Finland to supply the missing links and details.

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